



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

5073 7590 07/13/2009
BAKER BOTTS L.L.P.
2001 ROSS AVENUE
SUITE 600
DALLAS, TX 75201-2980

EXAMINER

BRUCKART, BENJAMIN R

ART UNIT

PAPER NUMBER

2446

DATE MAILED: 07/13/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,624	09/24/2003	John F. Wakerly	062891.1128	5626

TITLE OF INVENTION: PARTITIONED PACKET PROCESSING IN A MULTIPROCESSOR ENVIRONMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$0	\$0	\$1510	10/13/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE** OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

5073 7590 07/13/2009
BAKER BOTTS L.L.P.
2001 ROSS AVENUE
SUITE 600
DALLAS, TX 75201-2980

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/669,624 09/24/2003

John F. Wakerly

062891.1128

5626

TITLE OF INVENTION: PARTITIONED PACKET PROCESSING IN A MULTIPROCESSOR ENVIRONMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$0	\$0	\$1510	10/13/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
BRUCKART, BENJAMIN R	2446	709-231000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____
Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,624	09/24/2003	John F. Wakerly	062891.1128	5626
5073	7590	07/13/2009	EXAMINER	
BAKER BOTTS L.L.P. 2001 ROSS AVENUE SUITE 600 DALLAS, TX 75201-2980			BRUCKART, BENJAMIN R	
			ART UNIT	PAPER NUMBER
			2446	

DATE MAILED: 07/13/2009

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 1218 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 1218 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability**Application No.**

10/669,624

Applicant(s)

WAKERLY, JOHN F.

Examiner

BENJAMIN R. BRUCKART

Art Unit

2446

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to interview of 7-1-09.
2. ☒ The allowed claim(s) is/are renumbered 1-38.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

0EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview and email on 7/1/09 with Kurt Pankratz, Reg. No. 46,977.

The application has been amended as follows:

IN THE CLAIMS

1. **(Currently Amended)** A system for packet processing, the system comprising:
a shared memory maintaining a plurality of code partitions, the code partitions together implementing a feature set for packet processing;

a plurality of processors each comprising a processor core and an instruction memory loaded with at least one of the code partitions from the shared memory, the processor core operable to execute the loaded code partition to perform processing of packets and to generate migration requests for transferring packet processing operations from the loaded code partition;

a context manager operable to receive a migration request from one of the loaded code partitions executing within one of the processor cores, the migration request comprising packet context information and identifying a target one of the code partitions, the context manager further operable, in response to the migration request, to identify an available one of the processors having the target code partition loaded, and to communicate the packet context to the available one of the processors; [[and]]

wherein the context manager maintains a plurality of queues each corresponding to one of the code partitions, the context manager further operable, in response to the migration request, to place migration data comprising the packet context information into the queue associated with the target code partition, to monitor the queue associated with the target code partition, and upon determining that one of the processors having the target code partition loaded is available for processing, to communicate the packet context information to the available one of the processors;

wherein an initial one of the code partitions includes instructions for initial packet processing that identify a plurality of processing functions and, for each of the processing functions, include a migration instruction associated with the processing function that indicates another one of the code partitions; and

wherein a selected one of the processors assigned the initial code partition is operable to receive packet context information associated with a received packet, the selected processor further operable, by executing the initial code partition, to identify characteristics of the received packet that correspond to one of the processing functions, to select the migration instruction

associated with the identified processing function, and to generate a migration request that comprises the received packet context information and targets the other one of the code partitions indicated by the selected migration instruction.

2. (Canceled)

3. (Previously Presented) The system of Claim 1, wherein the context manager is further operable to service each of the queues using a first in first out servicing schedule.

4. (Previously Presented) The system of Claim 1, wherein the context manager is further operable to track an age for each entry in the queues and to service each of the queues based on the age for each of the entries.

5. (Original) The system of Claim 4, wherein the age for each of the entries identifies a time when a packet corresponding to the entry was received by the system.

6. (Previously Presented) The system of Claim 1, wherein prior to placing the migration data into the queue associated with the target code partition, the context manager is further operable to determine that the queue associated with the target code partition is empty and, in response, to bypass the queue by communicating the packet context information to the available one of the processors.

7. (Canceled)

8. (Canceled)

9. (Original) The system of Claim 1, wherein the packet context information comprises a stack pointer that indicates a location in the shared memory.

10. (Original) The system of Claim 1, wherein each of the processors further comprises

registers and is further operable, when processing a received packet, to transfer values out of selected ones of the registers into a stack in the shared memory prior to transmitting a migration request for the packet to the context manager.

11. **(Original)** The system of Claim 1, further comprising: a first interconnect coupling the shared memory and the processors; and

a second interconnect coupling the processors and the context manager, wherein the second interconnect provides a dedicated link for transferring at least a portion of packet processing information between the code partitions operating on the processors.

12. **(Original)** The system of Claim 1, wherein the context manager is further operable to assign some or all of the code partitions among the processors, to detect unbalanced operation that delays processing due to a selected one of the code partitions, and to reassign the code partitions such that the selected one of the code partitions is assigned to an increased number of the processors after the reassignment.

13. **(Original)** The system of Claim 1, wherein the migration request further identifies one of a plurality of entry points within the targeted code partition.

14. **(Original)** The system of Claim 13, wherein the migration request identifies the entry point using a program-counter offset from the beginning of the targeted code partition.

15. **(Original)** The system of Claim 13, wherein the migration request identifies the entry point using an index to a table entry.

16. **(Original)** The system of Claim 1, wherein at least one of the code partitions in the shared memory is not loaded in the instruction memory of any of the processors.

17. **(Original)** The system of Claim 16, wherein the context manager is further operable to receive a migration request targeting one of the code partitions not loaded into one of the

instruction memories and, in response, to initiate loading of the targeted one of the code partitions into the instruction memory of at least one of the processors.

18. **(Original)** The system of Claim 1, wherein each of the code partitions comprises one or more pages of instructions, and wherein each of the instruction memories is further operable to load selected ones of the code partitions using a paging scheme.

19. **(Original)** The system of Claim 1, wherein at least one of the processors is further operable to execute a plurality of processing threads, each of the processing threads operable to separately perform processing of packets using a loaded one of the code partitions.

20. **(Proposed Amendment)** A context manager for handling migration of packet processing, the context manager comprising:

- a processor; and

- a computer-readable medium comprising a program of instructions, the program of instructions comprising:

 - an interface operable to couple to a system comprising a plurality of processors and a shared memory maintaining a plurality of code partitions, wherein the code partitions together implement a feature set for packet processing and wherein each of the code partitions is assigned as unloaded or is assigned to at least one of the processors;

 - a migration manager operable to receive a migration request from a selected one of the processors, the migration request comprising packet context information and identifying a target one of the code partitions, the migration manager further operable, in response to the migration request, to identify an available one of the processors having the target code partition assigned, and to communicate the packet context to the available one of the processors; [[and]]

 - wherein the migration manager maintains a plurality of queues each corresponding to one of the code partitions and is further operable, in response to the migration request, to place migration data comprising the packet context information into the queue associated with the target code partition, to monitor the queue associated with the target code partition, and upon

determining that one of the processors having the target code partition loaded is available for processing, to communicate the packet context information to the available one of the processors;

wherein an initial one of the code partitions includes instructions for initial packet processing that identify a plurality of processing functions and, for each of the processing functions, include a migration instruction associated with the processing function that indicates another one of the code partitions; and

wherein a selected one of the processors assigned the initial code partition is operable to receive packet context information associated with a received packet, the selected processor further operable, by executing the initial code partition, to identify characteristics of the received packet that correspond to one of the processing functions, to select the migration instruction associated with the identified processing function, and to generate a migration request that comprises the received packet context information and targets the other one of the code partitions indicated by the selected migration instruction.

21. (Canceled)

22. (Previously Presented) The context manager of Claim 20, wherein the migration manager is further operable to service each of the queues using a first in first out servicing schedule.

23. (Previously Presented) The context manager of Claim 20, wherein the migration manager is further operable to track an age for each entry in the queues and to service each of the queues based on the age for each of the entries.

24. (Original) The context manager of Claim 23, wherein the age for each of the entries identifies a time when a packet corresponding to the entry was received by the system.

25. (Previously Presented) The context manager of Claim 20, wherein prior to placing the migration data into the queue associated with the target code partition, the migration manager

is further operable to determine that the queue associated with the target code partition is empty and, in response, to bypass the queue by communicating the packet context information to the available one of the processors.

26. (Canceled)

27. (Original) The context manager of Claim 20, wherein the packet context information comprises a stack pointer that indicates a location in a shared memory resource that is coupled to and accessible by each of the processors.

28. (Original) The context manager of Claim 20, wherein the migration manager is further operable to detect unbalanced operation that delays processing due to a selected one of the code partitions and to reassign the code partitions such that the selected one of the code partitions is assigned to an increased number of the processors after the reassignment.

29. (Proposed Amendment) A method for handling migration of packet processing, the method comprising:

- providing a system comprising a plurality of processors and a shared memory maintaining a plurality of code partitions, wherein the code partitions together implement a feature set for packet processing and wherein each of the code partitions is assigned as unloaded or is assigned to at least one of the processors;

- receiving a migration request from a selected one of the processors, the migration request comprising packet context information and identifying a target one of the code partitions;

- in response to the migration request, identifying an available one of the processors having the target code partition assigned;

- communicating the packet context information to the available one of the processors;

- maintaining a plurality of queues each corresponding to one of the code partitions;

- in response to the migration request, placing migration data comprising the packet context information into the queue associated with the target code partition;

- monitoring the queue associated with the target code partition; [[and]]

upon determining that one of the processors having the target code partition assigned is available for processing, communicating the packet context information to the available one of the processors;

wherein an initial one of the code partitions includes instructions for initial packet processing that identify a plurality of processing functions and, for each of the processing functions, include a migration instruction associated with the processing function that indicates another one of the code partitions; and

wherein a selected one of the processors assigned the initial code partition is operable to receive packet context information associated with a received packet, the selected processor further operable, by executing the initial code partition, to identify characteristics of the received packet that correspond to one of the processing functions, to select the migration instruction associated with the identified processing function, and to generate a migration request that comprises the received packet context information and targets the other one of the code partitions indicated by the selected migration instruction.

30. (Canceled)

31. (Previously Presented) The method of Claim 29, further comprising servicing each of the queues using a first in first out servicing schedule.

32. (Previously Presented) The method of Claim 29, further comprising:
tracking an age for each entry in each of the queues; and
servicing each of the queues based on the age for each of the entries.

33. (Previously Presented) The method of Claim 29, further comprising, prior to placing the migration data into the queue associated with the target code partition, determining that the queue associated with the target code partition is empty and, in response, bypassing the queue by communicating the packet context information to the available one of the processors.

34. (Canceled)

35. **(Original)** The method of Claim 29, wherein the packet context comprises a stack pointer that indicates a location in a shared memory resource that is coupled to and accessible by each of the processors.

36. **(Original)** The method of Claim 29, further comprising:
detecting unbalanced operation that delays processing due to a selected one of the code partitions;
determining assignments of the code partitions among the processors; and reassigning the code partitions such that the selected one of the code partitions is assigned to an increased number of the processors after the reassignment.

37. **(Original)** The method of Claim 29, further comprising receiving a migration request targeting one of the code partitions assigned as unloaded and, in response, loading the targeted one of the code partitions into the instruction memory of at least one of the processors.

38. **(Proposed Amendment)** A computer-readable medium comprising logic for handling migration of packet processing, the logic operable when executed to perform the steps of:

detecting a system comprising a plurality of processors and a shared memory maintaining a plurality of code partitions, wherein the code partitions together implement a feature set for packet processing and wherein each of the code partitions is assigned as unloaded or is assigned to at least one of the processors;

receiving a migration request from a selected one of the processors, the migration request comprising packet context information and identifying a target one of the code partitions;

in response to the migration request, identifying an available one of the processors having the target code partition assigned;

communicating the packet context information to the available one of the processors;

maintaining a plurality of queues each corresponding to one of the code partitions;

in response to the migration request, placing migration data comprising the packet context information into the queue associated with the target code partition;

monitoring the queue associated with the target code partition; [[and]]
upon determining that one of the processors having the target code assigned is available for processing, communicating the packet context information to the available one of the processors;

wherein an initial one of the code partitions includes instructions for initial packet processing that identify a plurality of processing functions and, for each of the processing functions, include a migration instruction associated with the processing function that indicates another one of the code partitions; and

wherein a selected one of the processors assigned the initial code partition is operable to receive packet context information associated with a received packet, the selected processor further operable, by executing the initial code partition, to identify characteristics of the received packet that correspond to one of the processing functions, to select the migration instruction associated with the identified processing function, and to generate a migration request that comprises the received packet context information and targets the other one of the code partitions indicated by the selected migration instruction.

39. (Canceled)

40. (Previously Presented) The computer-readable medium of Claim 38, further operable to service each of the queues using a first in first out servicing schedule.

41. (Previously Presented) The computer-readable medium of Claim 38, further operable when executed to perform the steps of: tracking an age for each entry in each of the queues; and servicing each of the queues based on the age for each of the entries.

42. (Previously Presented) The computer-readable medium of Claim 38, further operable when executed to perform the steps of, prior to placing the migration data into the queue associated with the target code partition, determining that the queue associated with the target code partition is empty and, in response, bypassing the queue by communicating the packet context information to the available one of the processors.

43. (Canceled)

44. (Previously Presented) The computer-readable medium of Claim 38, wherein the packet context comprises a stack pointer that indicates a location in a shared memory resource that is coupled to and accessible by each of the processors.

45. (Previously Presented) The computer-readable medium of Claim 38, further operable when executed to perform the steps of: detecting unbalanced operation that delays processing due to a selected one of the
code partitions; determining assignments of the code partitions among the processors;
and reassigning the code partitions such that the selected one of the code partitions is
assigned to an increased number of the processors after the reassignment.

46. (Previously Presented) The computer-readable medium of Claim 38, further operable to be executed on a selected one of the processors.

47. (Proposed Amendment) A system for packet processing, the system comprising:
memory means for maintaining a plurality of code partitions, the code partitions together
implementing a feature set for packet processing;

a plurality of processing means each operable to access the memory means, to be loaded
with one of the code partitions from the memory means, to execute the loaded code partition to
perform processing of packets, and to generate migration requests for transferring packet
processing operations from the loaded code partition; and

a context management means operable to receive a migration request from one of the
loaded code partitions, the migration request including a packet context and identifying a target
one of the code partitions, the context management means further operable, in response to the
migration request, to identify an available one of the processing means having the target code
partition loaded, and to communicate the packet context to the available one of the processing
means; [[and]]

wherein the context manager means maintains a plurality of queues each corresponding to one of the code partitions, the context manager means further operable, in response to the migration request, to place migration data comprising the packet context information into the queue associated with the target code partition, to monitor the queue associated with the target code partition, and upon determining that one of the processing means having the target code partition loaded is available for processing, to communicate the packet context information to the available one of the processing means;

wherein an initial one of the code partitions includes instructions for initial packet processing that identify a plurality of processing functions and, for each of the processing functions, include a migration instruction associated with the processing function that indicates another one of the code partitions; and

wherein a selected one of the processors assigned the initial code partition is operable to receive packet context information associated with a received packet, the selected processor further operable, by executing the initial code partition, to identify characteristics of the received packet that correspond to one of the processing functions, to select the migration instruction associated with the identified processing function, and to generate a migration request that comprises the received packet context information and targets the other one of the code partitions indicated by the selected migration instruction.

REASONS FOR ALLOWANCE

The following is the examiner's statement of reasons for allowance:

Renumbered independent claims 1, 17, 24, 31 and 38, among other things, teach a system, context manager, method, and medium for packet processing, that comprises: memory maintaining code partitions and a plurality of processors each comprising a processor core and an instruction memory, the core executes the loaded partition and generates migration requests for transferring packet processing operations from the loaded code partition; the migration requests, received at the context manager, comprising packet context information and identity of a target code partition, allowing the context manager to handle the migration request; the context manager maintains a plurality of queues each corresponding to one of the code partitions, the context manager further operable, in response to the migration request, to place migration data comprising the packet context information into the queue associated with the target code partition, to monitor the queue associated with the target code partition, and upon determining that one of the processors having the target code partition loaded is available for processing, to communicate the packet context information to the available one of the processors; specifically

wherein an initial one of the code partitions includes instructions for initial packet processing that identify a plurality of processing functions and, for each of the processing functions, include a migration instruction associated with the processing function that indicates another one of the code partitions; and wherein a selected one of the processors assigned the initial code partition is operable to receive packet context information associated with a received packet, the selected processor further operable, by executing the initial code partition, to identify characteristics of the received packet that correspond to one of the processing functions, to select the migration instruction associated with the identified processing function, and to generate a migration request that comprises the received packet context information and targets the other one of the code partitions indicated by the selected migration instruction in a computer networking environment.

The prior art does not teach the cited limitation.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

CORRESPONDANCE INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin R. Bruckart whose telephone number is (571) 272-3982. The examiner can normally be reached on 9:00-5:30PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeff Pwu can be reached on (571) 272-6798. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/669,624
Art Unit: 2446

Page 16

Benjamin R Bruckart
Examiner
Art Unit 2446

/Benjamin R Bruckart/
Primary Examiner, Art Unit 2446